and dated; and the third restricts the probable date of the beginning of volcanic activity in the region.

References

1. Bowen, C. F. *U. S. Geol. Survey Bull.*, 1914, **541**, 338–353, and 356–378.
2. Campbell, M. R. *Amer. J. Sci.*, 1906, **22**, 231–234.
3. Pecora, W. T. *Geol. Soc. Amer. Bull.*, 1941, **52**, 817–853.
4. ————. *Amer. Mineralogist*, 1942, **27**, 397–424.
5. ————. (With Bernard Fisher) *Amer. Mineralogist*, 1946, **31**, 370–385.
6. Pepperberg, L. J. *U. S. Geol. Survey Bull.*, 1912, **471**, 359–383.
7. Reeves, Frank. *U. S. Geol. Survey Bull.*, 1925, **751**, 71–114.

Sex Differences in Blood Pressure of Dogs

Edward J. Van Liere, J. Clifford Stickney, and David F. Marsh

Departments of Physiology and Pharmacology, School of Medicine, West Virginia University

There have been numerous reports in the literature dealing with blood pressure values in presumably normal men and women. Recently Boynton and Todd (*1*) reported blood pressure determinations on 75,258 students at the University of Minnesota—truly a formidable number. There were 43,800 men and 31,458 women in the various age groups studied. The mean systolic blood pressure for men and women of all ages was 122 and 111 mm of Hg respectively; the diastolic was 74.5 and 69.7 mm of Hg respectively. In every age group, save that over 40, the mean systolic pressure in men significantly exceeded that in women. Other workers have reported similar differences in blood pressure between the sexes, although a minority of authors believes that there is no significant difference.

It was thought worth while, from the standpoint of comparative physiology, to study the problem in the dog, to see if significant differences in blood pressure exist there between the sexes. It was deemed impracticable to determine the blood pressure in dogs by the indirect method, that is, by use of the inflated cuff. Therefore, 147 anesthetized dogs were used. Sodium barbital was the anesthetic chosen and was given either intravenously or intraperitoneally (300 mg/Kg). In the latter instance it was given 60 to 90 min prior to the blood pressure determinations. Under surgical anesthesia, a cannula was inserted into the carotid artery and the blood pressure recorded by means of a mercury manometer. After the normal blood pressure readings had been ascertained, these animals were used for other experimental purposes, before recovering from the surgical anesthesia.

Table 1 shows the results obtained. The male dogs had, on the average, a blood pressure of 9 mm Hg higher than that of the females. This difference is also reflected in the median values: 132 mm Hg for the males; and 124–125 for the females.

Tatum and Parsons (*3*) in 1922 called attention to the desirability of using barbital as an anesthetic agent for dogs, since it had the significant property of preserving an approximately normal blood pressure. As far as known, furthermore, the barbiturates have the same effect on male as on female dogs, in contradistinction to the action of some of them on male and female rats. Our results are not entirely comparable to those of Hamilton (*2*), who found no significant differences in blood pressure values between the sexes in street dogs. His method differed from ours, in that he used light doses of morphine sulfate and in that our experiments were performed on unselected dogs. It was impossible for us to control the age factor, except for the fact that only adult dogs were used.

TABLE 1

Sex Differences in Blood Pressure in Dogs

Blood pressure range mm of Hg	Number of males	Number of females	Male average mm of Hg	Female average mm of Hg
60–79	0	1	...	60
80–99	3	6	91	92
100–119	12	24	111	110
120–139	28	24	129	128
140–159	14	23	150	147
160–179	9	2	165	166
180–199	1	0	190	....
60–199	67	80	134	125*
	Standard	Deviation :	21.5	20.7

* The difference (9 mm of Hg) between blood pressure for male and female dogs has a t value (according to Fisher) of 2.5803; for this value p is 0.011. The standard error of this difference is 3.50.

It is to be concluded from our data that in adult barbitalized dogs, males have a significantly ($p = 0.011$) higher mean systemic blood pressure than females by 9 mm Hg.

References

1. Boynton, R. E., and Todd, R. L. *Arch. int. Med.*, 1947, **80**, 454.
2. Hamilton, W. F., *et al.* *Amer. J. Physiol.*, 1940, **128**, 233.
3. Tatum, A. L., and Parsons, E. *J. lab. clin. Med.*, 1922, **8**, 64.

A Metabolism Cage for Small Animals

B. K. Harned, Raymond W. Cunningham, and Edna R. Gill

Lederle Laboratories, Pearl River, New York

The cage designed by Henriques and Hansen (*3*) for the quantitative collection of urine and described by them in 1904 has undergone numerous modifications. Some of these have simplified the form and increased the ruggedness (*1, 2*) while others have overcome specific problems in quantitative collection (*4*). The modification described below falls into the last category and was designed to isolate the feces so that subsequent specimens of urine could not contact them. The value of this adap-

tation is obvious when one wishes to analyze the urine for a compound which may be present also in the feces.

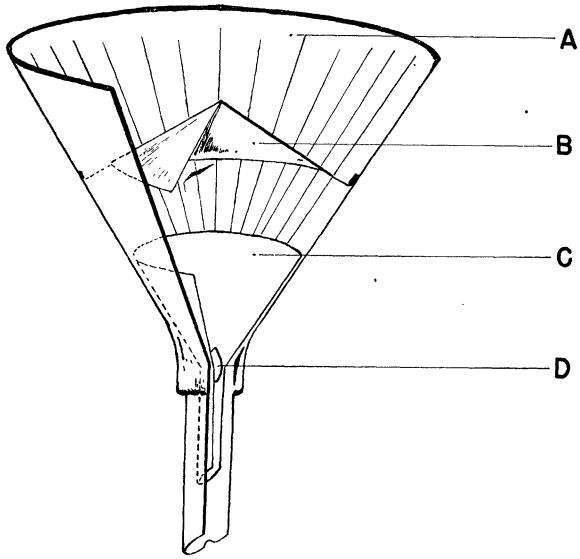

FIG. 1

The essential features of the new separating unit are shown in Figs. 1 and 2. A 3-in funnel (C) placed inside of a 10½-in ribbed funnel (A) collects the feces which either roll down the sides of (A) or hit the conical shield (B) and are deflected first to (A) and then to (C). The rim of the smaller funnel should be thin, approximately 1/32 in. A glass plug (D) prevents feces from entering the neck of funnel (C). Funnel (A) is a ribbed Mooney air vent model, preferred because of its small neck. Shield (B), detailed in Fig. 2,

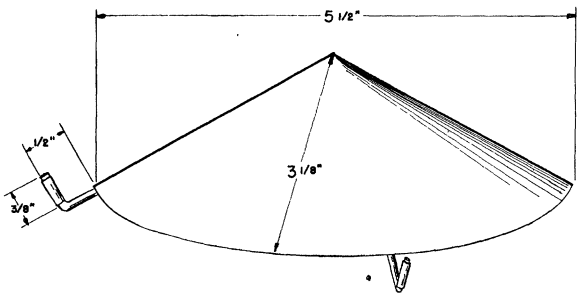

FIG. 2.

completely covers funnel (C) and deflects all urine to the surface of (A) where it runs between the funnels into a collecting graduate. This shield is a right circular cone with a slant height of 3⅛ in and a diameter of 5½ in at the base. It is supported by three rods 3/32 in in diameter and bent at such an angle that the terminal ⅜ in rests snugly on the sides of funnel (A). That portion of the rod which contacts the funnel is covered with rubber to prevent slipping. The cone is made of copper coated with tin and covered with a thin uniform layer of paraffin.

This assembly (Fig. 1) is supported by a 6-in iron ring anchored to a large ring stand. The animal is confined in a cylindrical cage 8½ in in diameter and 9 in high, made from ½-in wire mesh. This cage is anchored to the same stand by an L-shaped iron rod which supports it in funnel (A) so that its bottom is ½ in below the rim of the funnel and ½ in above the vertex of cone (B).

Twenty of these units have been in use for more than two years and satisfactorily accomplish the purpose for which they were designed.

References

1. ATKIN, L. in *Practical physiological chemistry* of P. B. Hawk, B. L. Oser, and W. H. Summerson. Philadelphia: Blakiston, 1947, 1268.
2. GRIFFITH, J. Q., and FARRIS, E. J. (Eds.). *Rat in laboratory investigation.* Philadelphia: Lippincott, 1942, 11.
3. HENRIQUES, V., and HANSEN, C. *Z. physiol. Chem.,* 1904, **43**, 418.
4. LEVINE, H., and SMITH, A. H. *J. lab. clin. Med.,* 1925, **11**, 168.

Penicillin in Relation to Acid Production in Milk by Starter Cultures Used in Cheddar Cheesemaking[1]

H. Katznelson and E. G. Hood
Division of Bacteriology and Dairy Research, Department of Agriculture, Ottawa, Canada

The extensive use of penicillin in control of bovine mastitis has resulted in warnings to cheese factory milk producers (*1*) that sufficient penicillin may be carried over into the milk to interfere with normal development of acid by starter culture organisms when added to this milk in manufacturing Cheddar cheese. Slowness of acid production in the vat extends the time of manufacturing appreciably and results usually in low quality cheese.

The problem was studied by inoculating mixed or single strain starter cultures at the rate of 3% into pasteurized milk, dispensing 100-ml amounts into bottles, and adding a known amount of penicillin (ranging from 10,000 to 0.05 units) to each bottle. The bottles were incubated in a water bath at 98° F; 9-ml aliquots were removed at hourly intervals for titration with 0.1 N NaOH using phenolphthalein as indicator. Complete inhibition of acid production was obtained with 100 units, and virtually complete stoppage with 50 units penicillin per 100 ml milk. Partial inhibition was evident with 0.5–5.0 units in both the mixed and single strain starter series.

Penicillinase[2] when added at the rate of 0.02 mg per bottle completely canceled the effect of 5–10 units of penicillin and permitted appreciable acid production in the presence of 100 units of the antibiotic. The devel-

[1] Contribution No. 275.

[2] Kindly supplied by Miss E. Campbell, Laboratory of Hygiene, Department of National Health and Welfare, Ottawa, Canada.